

REMARKS

Claims 1 - 7 and 9 - 21 are now pending in the application. By this amendment, Claim 8 has been canceled and Claim 5 amended. Independent Claim 21, patterned after Claim 2, has been added.

Claims 1, 5, 8, 9, 14 and 17 have been rejected by the Examiner. Claims 2 - 4, 6, 7, 10 - 13, 15, 16 and 18 - 20 have been objected to by the Examiner. Applicants acknowledge, with appreciation, the Examiner's indication that Claims 2 - 4, 6, 7, 10 - 13, 15, 16 and 18 - 20 would be allowable if rewritten in independent form. In this regard, Applicants have added independent Claim 21 which includes all of the limitations of Claims 1 and 2. Accordingly, Claim 21, as presented, should clearly be allowable.

Drawings Objections

The Examiner has objected to the drawings as failing to comply with 37 CFR 1.84 (p) (5). The Examiner advises, in this regard, that reference character 23 mentioned in Applicants' written description is not shown.

In response to the Examiner's objection under 37 CFR 1.84 (p) (5), Applicants are submitting herewith a replacement sheet for sheet 2 (Figure 2) of the drawings which amends Figure 2 to include reference character 23. Accordingly, Applicants believe that the drawings in this regard now comply.

The Examiner has also objected to the drawings under 37 CFR 1.83(a). The Examiner states, in this regard, that the circuit board of Claim 8 must be shown or the feature(s) canceled from the claim(s).

In response to the later objection, Applicants are herein canceling Claim 8.

Although Applicants believe that circuit boards are well known in the art and may simply be represented symbolically in the drawings, in order to expedite prosecution Applicants have elected to cancel the claimed feature.

Claim Rejections - 35 USC 112

Claim 5 has been rejected under 35 USC 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. The Examiner states that Claim 5 has insufficient antecedent for the limitation "said heat spreading lid" in line 3.

In response to this rejection, Applicants have amended Claim 5 to depend upon Claim 2 which claim provides the proper antecedent for "said heat spreading lid".

Claim 8 has also been rejected as being vague and indefinite because the circuit board has not been shown in the drawings. As hereinabove indicated, Claim 8 has now been canceled.

Claim Rejection - 35 USC 103

Claims 1, 5, 9, 14 and 17 have been rejected as being unpatentable over Lai, et al. in view of Feigenbaum, et al. The Examiner basically asserts, in this rejection, that Lai, et al. disclose the claimed invention, except the notch cuts at the midpoint of the opposing sides of the base plate to provide a slot to clamp the heat sink to the chip carrier. For the notch cuts in question, the Examiner relies upon Feigenbaum, et al.

Lai, et al. discloses a mounting assembly for securing a heat sink to an electronic package. The electronic package is, in turn, mounted on a circuit board. Thus, heat sink 10 of Lai, et al. is attached to electronic package 50, with electronic package 50 mounted on circuit board 40. Circuit board 40 is provided with holes or bores which allow posts from back plate 20 to extend therethrough and into holes in plate 12 of heat sink 10. Holes in clip 30 act to receive the pins and allow the assembly to be held together by screws 70 that engage threaded holes in the posts.

Feigenbaum, et al., on the other hand, show an assembly for the solderless mounting of electrical modules to PCBs. This is done through the use of a flex circuit 14 and a plurality of fasteners or screws 16 that extend through holes in both a receptacle 12 and the PCB to a back plate 22. A heat sink 24 is clamped over an air passage way 40 in the receptacle which passage way facilitates cooling. The receptacle, in turn, holds the electronic module leads 28 against the flexible circuit 14 to make solderless contact with the PCB.

Invention Distinction Over Lai, et al. and Feigenbaum, et al.

One common feature in both Lai, et al. and Feigenbaum, et al. is that both provide holes in the PCB to allow screws or post to pass there through to hold the assembly together. Contrary to both Lai, et al. and Feigenbaum, et al., Applicants mount posts on a chip carrier rather than forming holes in a PCB.

As shown in Figures 1 and 2 of Applicants' specification, corner posts 3 are mounted on chip carrier 1. This may be done with an epoxy, for example. As stated by Applicants at the bottom of page 4 and the top of page 5 of their specification, "using an

epoxy, solder or the like, avoids the necessity of having to modify the chip carrier by forming holes in the carrier for screws, post insertion, or the like". Applicants go on to state that, "in addition, attaching the posts directly to the chip carrier also avoids the necessity of having to modify the PCB, upon which the chip carrier sets, by forming holes for posts or screws to hold the heat sink thereon" (emphasis added). As further pointed out, "avoiding the necessity of having to form holes in the PCB for attaching the heat sink saves much needed wiring area" (emphasis added).

Thus, Applicants' invention distinguishes over both Lai, et al. and Fergenbaum, et al. by employing an attachment arrangement that clamps the heat sink directly to the chip carrier. This is done by affixing attachment posts directly to the chip carrier which carrier is, in turn, mounted on the PCB. Contrary to such an approach, Lai, et al. and Feigenbaum, et al. use an attachment arrangement which clamps the heat sink to a backplate through holes in the PCB thereby using wiring space in the PCB.

Claim Distinctions Over Lai, et al. and Feigenbaum, et al.

Independent Claim 1, 9 and 14 recite limitations that particularly point out the invention distinctions over Lai, et al. and Feigenbaum, et al. For example, Claim 1 recites "a chip carrier having four corner posts mounted thereon and at least one chip attached thereto" (emphasis added). Neither reference relied upon by the Examiner teaches posts mounted upon a chip carrier. Even assuming, for the sake of argument, that the PCBs of Lai, et al. and Feigenbaum, et al. are considered a chip carrier, they fail to employ posts but rather employ holes. However, relying upon such an assumption for purposes of argument would also be erroneous, since Applicants' claims clearly call for a chip carrier

which chip carrier is defined in the specification in such a way as to distinguish it from the PCB upon which it is to be mounted. As pointed out above, employing holes in the PCB uses valuable wiring area.

Claim 1 further distinguishes over the combination of Lai, et al. and Feigenbaum, et al. by reciting structural limitations in the second paragraph thereof that acts "to clamp said heat sink directly to said chip carrier" (line 11 emphasis added). Lai, et al. teach clamping the heat sink through PCB 40 to back plate 20 rather than to any chip carrier. Feigenbaum, et al. teach clamping the heat sink, through receptacle 12 and PCB 20, to back plate 22 rather than to any chip carrier. This arrangement of Feigenbaum, et al. is necessary to support the solderless connection arrangement of their invention.

However, given the differences between the Lai, et al. and Feigenbaum, et al. invention structures, it is not clear to Applicants how the teachings of Feigenbaum, et al. can even be employed in Lai, et al. Lai, et al. do not employ a heat sink arrangement that could use the clamping arrangement of Feigenbaum, et al. Lai, et al. uses a clamping arrangement of posts in clamp holes that align with holes in their heat sink and PCB to position the heat sink in contact with their electronic package. Feigenbaum, et al., on the other hand, do not employ holes in their heat sink to accommodate clamping and do not clamp their heat sink directly to an electronic component but rather position the heat sink using a clip to contact an opening in their receptacle. Feigenbaum, et al. relies upon heat ventilation for cooling through the opening. The clamping arrangement of Feigenbaum, et al. is clearly designed for the Feigenbaum, et al. invention, not the Lai, et al. invention.

Independent Claims 9 and 14 call for similar distinguishing limitation, as Claim 1. In this regard, it is noted that Claim 9 also adds the limitation that the posts are mounted to the chip carrier "with a bonding material".

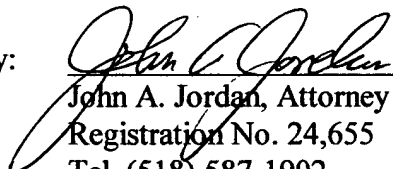
Conclusion

Applicants firmly believe that all of the claims, as now presented, are clearly allowable. Accordingly, Applicants respectfully request the Examiner to reconsider the outstanding rejections in view of Applicants' amendment and remarks, allow the claims as now presented, and pass the case to issue.

Respectfully submitted,

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